

# Penn Cambria Curriculum

<b>Course Name</b>	<b>Anatomy &amp; Physiology 2</b>
<b>Length of Course</b>	1 credit (GPA weighted 1.10 credits) - 1 period per day for 1 semester
<b>Grade Level</b>	12
<b>Prerequisites</b>	85% or above in Anatomy & Physiology 1, or permission of the department.
<b>Course Description</b>	Anatomy and Physiology II is a continuation of Anatomy and Physiology I. Using a variety of techniques, students will study special senses, metabolism, and the endocrine, cardiovascular, lymphatic, immune, respiratory, digestive, urinary, and reproductive systems. Emphasis is placed on student participation in the laboratory for discovery, application, and reinforcement. Some lab work involves dissection to show actual structures, their relationships to other structures and the differences in organisms. Other lab work will involve physiological experiments which may utilize technology. This course is equivalent to an introductory college course in Anatomy and Physiology and may be taken for college credit.
<b>Units of Study</b>	<ul style="list-style-type: none"> <li>I. Communication, Integration, and Control               <ul style="list-style-type: none"> <li>A. Special Senses</li> <li>B. Autonomic Nervous System</li> <li>C. Endocrine System</li> </ul> </li> <li>II. Cardiovascular System and Defense               <ul style="list-style-type: none"> <li>A. Blood</li> <li>B. Heart</li> <li>C. Blood Vessels and Circulation</li> <li>D. Lymphatic System and Immunity</li> </ul> </li> <li>III. Respiration, Digestion, and Excretion               <ul style="list-style-type: none"> <li>A. Respiratory System</li> <li>B. Digestive System</li> <li>C. Nutrition, Metabolism, and Temperature Regulation</li> <li>D. Urinary System and Body Fluids</li> </ul> </li> <li>IV. Reproduction and Development               <ul style="list-style-type: none"> <li>A. Reproductive System</li> <li>B. Development</li> </ul> </li> </ul>
<b>Materials</b>	<p>Text: Tate, Philip. <u>Seeley's Principles of Anatomy &amp; Physiology</u>. 1<sup>st</sup> ed. McGraw-Hill Publishers, 2009.</p> <p>Supplemental Materials:</p> <p>Wise, Eric. <u>Seeley's Principle's of Anatomy &amp; Physiology Laboratory Manual</u>. 1<sup>st</sup> ed. McGraw-Hill Publishers. 2009.</p> <p><u>Anatomy &amp; Physiology Revealed CD-ROM</u>, 2.0 and accompanying workbook. McGraw-Hill Publishers, 2009.</p> <p><u>MediaPhys 3.0 – An Introduction to Human Physiology CD-ROM</u>. McGraw-Hill Publishers, 2005.</p> <p><u>Ph.I.L.S – Physiology Interactive Lab Simulations CD-ROM</u>, 3.0. McGraw-Hill Publishers, 2008.</p> <p>Labs and drawings from various sources</p>

Note: This is a dual-enrollment class with Mount Aloysius College (BL 202 – 4 credits)

## **Unit: Communication, Integration, and Control**

**Estimated Time: 4 – 6 weeks**

### **Standard Alignment:**

- 3.1.12.B – Apply concepts of models as a method to predict and understand science and technology.
- 3.1.12.C – Assess and apply patterns in science and technology.
- 3.1.12.E – Evaluate change in nature, physical systems, and man-made systems.
- 3.2.12.A – Evaluate the nature of scientific and technological knowledge
- 3.3.12.A – Explain the relationship between structure and function at all levels of organization.
- 3.3.12.B – Analyze the chemical and structural basis of living organisms.
- 10.1.12A – Evaluate factors that impact growth and development during adulthood and late adulthood.
- 10.1.12B – Evaluate factors that impact the body systems and apply protective/preventive strategies.
- 10.1.12E – Identify and analyze factors that influence the prevention and control of health problems.

### **Curricular Objectives:**

The student will be able to:

- Describe how the structures of taste buds and the olfactory epithelium function to give taste and smell.
- Label and identify the parts of the eye and its accessory structures; and explain the functions of the parts.
- Explain how the eye receives light, focuses the light on the retina, and produces action potentials.
- Trace the neuronal pathways for vision and describe how vision results.
- Distinguish among the disorders of the eye and vision and how each may be corrected.
- Label and identify the parts of the ear and explain the functions of the parts.
- Explain how sound is received, transmitted, and converted into action potentials by the spiral organ.
- Trace the neuronal pathways for hearing.
- Describe the structures involved with static and dynamic balance, and how they function.
- Discuss disorders of the ear.
- Contrast the somatic and autonomic nervous systems.
- Draw and label the structures of the autonomic nervous system (ANS), highlighting the differences between the sympathetic and parasympathetic divisions.
- Discuss the structures and functions of the enteric nervous system.
- Distinguish between the types of neurotransmitters and receptors of the ANS and the roles in ANS function.
- Describe the effects of sympathetic and parasympathetic stimulation on various tissues or organs.
- Explain regulation and functional generalizations about the ANS.
- Compare and contrast the nervous and endocrine systems.
- Discuss the types of hormones and how each functions to produce a response from its target tissue/organs.
- List each hormone, the organ that produced it, the target organ(s), the response, and consequences of hypersecretion or hyposecretion.
- Discuss the hormone-like substances in the body and the roles they play as chemical signals.

**Assessments/ Measurement of Objectives:**

- Labeling drawings of the eye, ear, autonomic nervous system, and the endocrine system.
- Textbook review exercises
- Online review quizzes
- Vocabulary exercises
- Objective tests and quizzes with various types of questions
- Lab activities
- Dissection identification activities
- Lab activity reports

**Suggested Methods of Instruction / Learning Activities:**

- Direct instruction with presentation software
- Vocabulary activities
- Human torso, eye, and ear models
- Videos
- Online activities
- Cat dissection labs
- Cow eye labs
- Vision, hearing, and balance labs
- Readings on hormone abuse
- Guest speakers on eye surgery
- Class discussions

## **Unit: Cardiovascular System and Immunity**

**Estimated Time:** 4 – 6 weeks

### **Standard Alignment:**

3.1.12.B – Apply concepts of models as a method to predict and understand science and technology.  
3.1.12.C – Assess and apply patterns in science and technology.  
3.1.12.E – Evaluate change in nature, physical systems, and man-made systems.  
3.2.12.A – Evaluate the nature of scientific and technological knowledge  
3.3.12.A – Explain the relationship between structure and function at all levels of organization.  
3.3.12.B – Analyze the chemical and structural basis of living organisms.  
10.1.12A – Evaluate factors that impact growth and development during adulthood and late adulthood.  
10.1.12B – Evaluate factors that impact the body systems and apply protective/preventive strategies.  
10.1.12E – Identify and analyze factors that influence the prevention and control of health problems.  
10.4.12C – Evaluate how changes in adult health status may affect the responses of the body systems during moderate to vigorous physical activity.

### **Curricular Objectives:**

The student will be able to:

- Describe the functions of blood and components of blood.
- Discuss the formed elements of blood – types, production, functions, and common disorders.
- Explain the ABO and Rh blood typing systems and their importance.
- List and define various diagnostic blood tests.
- Label and identify the external and internal structures of the heart.
- Describe the route of blood through the heart (pulmonary circuit) and how the heart receives its blood supply.
- Discuss the histology of the heart and how action potentials are generated and transmitted through the heart.
- Discuss the events of the cardiac cycle, relating them to valve action, heart sounds, and the ECG.
- Calculate mean arterial pressure if given a blood pressure reading.
- Describe the intrinsic and extrinsic regulation of the heart and how the heart helps to maintain homeostasis.
- Explain the effects of aging on the heart.
- Compare and contrast the structures of arteries, veins, and capillaries.
- Label and identify major human and cat arteries and veins.
- Discuss the physiology and control of circulation, including blood pressure, blood flow, and capillary exchange.
- Explain cardiovascular regulation by using exercise as an example.
- Describe the structures and functions of the lymphatic system.
- Distinguish between innate and adaptive immunities.
- Describe how innate immunity is accomplished through mechanical mechanisms, chemical mediators, and the inflammatory response.
- Explain the types, roles and activation of lymphocytes for adaptive immunity.
- Describe the processes of antibody-mediated immunity and cell-mediated immunity.
- Detail the four ways to acquire adaptive immunity.
- Discuss immune system problems of clinical significance and the effects of aging on the lymphatic and immune systems.

**Assessments/ Measurement of Objectives:**

- Labeling drawings of the heart, major arteries, and major veins.
- Textbook review exercises
- Online review quizzes
- Vocabulary exercises
- Objective quizzes and tests with various types of questions
- Lab activities
- Dissection identification activities
- Lab activity reports

**Suggested Methods of Instruction / Learning Activities:**

- Direct instruction with presentation software
- Vocabulary exercises
- Models of the heart
- Videos
- Online activities
- Cat dissection labs
- Deer heart dissection lab
- Cardiac function labs
- Blood typing simulation lab
- Guest speakers on heart surgeries and phlebotomy

## **Unit: Respiration, Digestion, and Excretion**

**Estimated Time:** 5 – 7 weeks

### **Standard Alignment:**

- 3.1.12.B – Apply concepts of models as a method to predict and understand science and technology.
- 3.1.12.C – Assess and apply patterns in science and technology.
- 3.1.12.E – Evaluate change in nature, physical systems, and man-made systems.
- 3.2.12.A – Evaluate the nature of scientific and technological knowledge
- 3.3.12.A – Explain the relationship between structure and function at all levels of organization.
- 3.3.12.B – Analyze the chemical and structural basis of living organisms.
- 10.1.12A – Evaluate factors that impact growth and development during adulthood and late adulthood.
- 10.1.12B – Evaluate factors that impact the body systems and apply protective/preventive strategies.
- 10.1.12E – Identify and analyze factors that influence the prevention and control of health problems.
- 10.4.12C – Evaluate how changes in adult health status may affect the responses of the body systems during moderate to vigorous physical activity.

### **Curricular Objectives:**

The student will be able to:

- List and briefly describe the functions of the respiratory system.
- Describe the anatomy and functions of the parts of the respiratory system.
- Detail the steps in ventilation – inspiration and expiration.
- Discuss the various measurements used to assess lung function.
- Explain the processes of external respiration, gas transport, and internal respiration.
- Describe how ventilation is regulated and how it adapts to changing conditions.
- List and briefly explain the functions of the digestive system.
- Discuss the histology of the digestive tract and how adaptations for specific functions are made.
- List each organ of the digestive tract, its structure and role(s) in the digestive process.
- List each accessory structure of the digestive tract, its structure and role(s) in the digestive process.
- Describe the stimulation and regulation of the digestive organs and secretions.
- Explain the chemical digestion, absorption, and transport of the three major food types (carbohydrates, lipids, and proteins), along with water and ions.
- Discuss some disorders of the digestive tract and the effects of aging on the digestive system.
- Define nutrient and describe MyPyramid.
- Describe the sources in the diet, uses in the body, and recommended amounts for carbohydrates, lipids, proteins, vitamins, and minerals.
- Explain what occurs in each step of carbohydrate metabolism – glycolysis, citric acid cycle, and electron transport chain; and describe the differences between anaerobic and aerobic respiration.
- Describe the processes involved in lipid and protein metabolism.
- Explain how the metabolism processes for carbohydrates, lipids, and proteins are inter-related.
- Compare and contrast the absorptive and postabsorptive states.
- Explain metabolic rate – how it is determined and how metabolic energy is used.
- Discuss the maintenance of normal body temperature.
- List and briefly explain the functions of the urinary system.
- Describe the anatomy and histology of the kidney.
- Explain the three steps of urine production and how each step is measured and regulated by autoregulation, the ANS, and hormones.

- Discuss the structure and functions of the ureters, urinary bladder, and urethra.
- Explain the micturition reflex.
- List some effects of aging on the urinary system.
- Describe the body's fluid compartments and how materials move between compartments.
- Explain how body fluid volume and concentration are regulated through water input and output.
- Discuss the regulation of specific electrolytes in the extracellular fluid – sodium, chloride, potassium, calcium, and other ions.
- Describe the mechanisms used by the body to maintain acid-base balance – buffers, respiration, and renal.
- Analyze blood test values and determine if the patient is experiencing acidosis or alkalosis, the type, and if compensation is occurring.

#### **Assessments/ Measurement of Objectives:**

- Labeling drawings of the respiratory, digestive, and urinary systems.
- Textbook review exercises
- Online review quizzes
- Vocabulary exercises
- Objective quizzes and tests with various types of questions
- Lab activities
- Lab activity reports
- Dissection identification activities

#### **Suggested Methods of Instruction / Learning Activities:**

- PowerPoint lessons
- Vocabulary activities
- Human torso model
- Lung function model
- Videos
- Online activities
- Cat dissection labs
- Respiratory function labs
- Chemical digestion labs
- Metabolism labs
- Urinalysis (simulation) labs

## **Unit: Reproduction and Development**

**Estimated Time:** 1 -2 weeks

### **Standard Alignment:**

- 3.1.12.B – Apply concepts of models as a method to predict and understand science and technology.
- 3.1.12.C – Assess and apply patterns in science and technology.
- 3.1.12.E – Evaluate change in nature, physical systems, and man-made systems.
- 3.2.12.A – Evaluate the nature of scientific and technological knowledge
- 3.3.12.A – Explain the relationship between structure and function at all levels of organization.
- 3.3.12.B – Analyze the chemical and structural basis of living organisms.
- 10.1.12A – Evaluate factors that impact growth and development during adulthood and late adulthood.
- 10.1.12B – Evaluate factors that impact the body systems and apply protective/preventive strategies.
- 10.1.12E – Identify and analyze factors that influence the prevention and control of health problems.

### **Curricular Objectives:**

The student will be able to:

- List and describe the functions of the male and female reproductive systems.
- Explain the process of meiosis and how it differs from mitosis.
- Describe specific characteristics of spermatogenesis and oogenesis.
- Describe the structures and functions of the organs and accessory glands of the male reproductive system.
- Discuss the regulation of the male reproductive functions by hormonal and neural mechanisms.
- Describe the structures and functions of the organs of the female reproductive system.
- Explain the hormonal and neural controls of the female reproductive cycles.
- Describe several methods of birth control.
- Discuss the effects of aging on the male and female reproductive systems.
- Detail the events of prenatal development from fertilization to birth.
- Describe the formation of the primary germ layers and the subsequent formation of the various organ systems in the embryo and fetus.
- Explain what occurs during the three stages of labor.
- Discuss the changes that occur in the newborn.
- Describe several congenital disorders.

### **Assessments/ Measurement of Objectives:**

- Labeling drawings of the male and female reproductive systems, spermatogenesis, and oogenesis.
- Textbook review exercises
- Online review quizzes
- Vocabulary exercises
- Objective quizzes and tests with various types of questions
- Lab activities
- Lab activity reports
- Dissection identification activities

### **Suggested Methods of Instruction / Learning Activities:**

- PowerPoint lessons
- Vocabulary activities
- Models of mitosis, meiosis, spermatogenesis, and oogenesis
- Videos
- Online activities
- Cat dissection labs